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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

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The Rev. R. Main, President, in the Chair.

[illegible]art Stuart Glennie, Esq., 6 Stone Buildings, Lincoln's Inn;
Henry George Bohn, Esq., York Street, Covent Garden;
Philip E. Sewell, Esq., Fuente del Mar, Santander;
John M. Stothard, M.D., 11 Lower Sherrard Street, Dublin;
E. J. Stone, Esq., First Assistant, Royal Observatory, Greenwich; and
C. P. Mason, Esq., Denmark Hill Grammar School,

were balloted for and duly elected Fellows of the Society.

On the Binary Star η Cassiopeæ.

By Eyre B. Powell, Esq.

I believe up to this time no orbit has been put forward for the binary star, η *Cassiopeæ;* I am aware of attempts having been made in past years to arrive at elements by two or three individuals beside myself, but the results proved altogether unsatisfactory, owing to the irregularities existing among the early observations, especially those of distance. I now do myself the pleasure of laying before the Society an approximate orbit, at which I have arrived after the expenditure of no little trouble; but, in so doing, I wish it to be understood that, in consequence of the peculiar circumstances of the case, I do not claim for the elements any higher rank than that of a *first* approximation to the truth.

Some of the early distance measures are utterly irreconcilable with one another; and, perhaps, the most important, that of the founder of this branch of astronomy, Sir William

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Herschel, is shown to be considerably too small by Kepler's law of areas. The angle of true anomaly, moreover, which has been described since 1779, falls short of 40°, and is so situated as not to afford a good grasp of the orbit. Any conclusions, therefore, which may be drawn at present must necessarily be insecure. Still, as it will take some thirty-five years for the *comes* to round the vertex of the apparent ellipse and reach its periastre, before which time a close approximation to the elements will scarcely be attainable, there seems no reason for deferring the attempt to reduce the motion in some degree to line and measure.

After some previous approximations I arrived at the following elements, using for the most part Sir John Herschel's graphical method, and calculating n and τ by means of different pairs of equations, the final sets of which afforded results in fair agreement with each other. Here I may remark in passing that this way of determining the mean motion and the time of periastral passage seems to me decidedly the best, when once [illegible] perspective ellipse has been fixed with tolerable accura[illegible]

Apparent Orbit.

Axis major	= 15″·8
Axis minor	= 9″·2
Maximum distance	= 12″·84
Position angle for do.	= 60°
Minimum distance	= 1″·3
Position angle for do.	= 288° 10′
C A, projection of semi-major axis of real orbit	= 6″·72
C B, projection of semi-minor axis of real orbit	= 6″·1
C S, projection of linear excentricity of real orbit	= 5″·18
Position angle for S A	= 252° 30′
Position angle for focal distance parallel to C B	= 190° 50′

Elements of Real Orbit.

$\varpi = 252^\circ\ 30'$

$e = \cdot770833$

$\Omega = 25^\circ\ 33'$

$\gamma = 57^\circ\ 59'$

$a = 10''\cdot335$

$n = 1^\circ\cdot989$, P = 181 years nearly,

$\tau = 1715\cdot0$

The annexed table exhibits the degree of correctness with which the elements represent the recorded motion of the star; in it I have taken the most reliable of the observations within my reach, and in many cases have used the means of nearly contemporaneous groups.

Date.	P_0		P_c-P_0	D_0	D_c-D_0	Observer.	Remarks.
	°	′	′	″	″		
1779·63	62	4	− 96	11·27	+ 1·43	H	P_0=60° 6′ for 1782·4, according to h, in vol. v., R. Ast. Soc. *Memoirs*. The value here is from the *Phil. Trans*.
1803·1	70	46	+ 32	......	......	H	
1819·8	80	12	+ 10	10·8	+ ·13	Σ	
1825·78	83	5	+ 61	9·9	+ ·54	S	
1830·17	87	13	− 6	10·1	− ·04	h, Sm	h., 1829·43; Sm., 1830·91.
1833·3	89	1	+ 24	9·91	− ·14	Sm, D, Sm, Sm.	Sm., 1831·84; D., 1832·87; Sm., 1833·7; Sm., 1834·77.
1836·79	92	0	+ 6	9·43	+ ·01	Σ, Sm	Σ. and Sm. in admirable agreement. Σ., 1836·78; Sm. 1836·81.
1843·19	95	48	+ 109	9·1	− ·28	Sm	On examining the interpolating position curve, P_0 is clearly seen to be too small.
1847·42	102	0	+ 47	8·65	− ·36	J	
1851·84	106	38	− 7	8·06	− ·07	J, J, J	1850·876; 1851·89; 1852·76.
1853·68	109	23	− 42	7·95	− ·21	J, J, P	J., 1853·14; P., 1853·92; J., 1853·99.
1856·0	112	26	− 56	7·6	− ·06	J, P	J., 1856·07; P., 1855·93.
1857·56	114	2	− 30	7·45	− ·11	J, J	1857·06; 1858·06.
1859·72	116	35	− 5	7·02	+ 1·1	P	

H, Sir W. Herschel; Σ, Professor Struve; S, Sir J. South; h, Sir J. Herschel; Sm, Admiral Smyth; J, Captain Jacob; P, myself.

Owing to the unfavourable weather here, I have not secured any recent observations of η.

For the purpose of comparing the orbit with future observations I append the calculated places of the *comes* for the next five years.

Date.	Position.		Distance.
	°	′	″
1861·0	118	21	6·99
1862·0	119	51	6·89
1863·0	121	21	6·79
1864·0	122	58	6·69
1865·0	124	35	6·59

It is to be remarked, however, that the arc which will be described during the next ten or twelve years may be made, within moderate limits of error, to belong to different ellipses partaking of an osculating character.

Madras, December 1, 1860.

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